WE CLAIM:

1. A device comprising:

a lower electrode;

a substrate formed on the lower electrode;

a triangle mesa structure formed on the substrate for lateral confinement of light;

a triangle optical cavity formed in the mesa structure;

an upper electrode formed on the mesa structure; and

a plurality of contact spots formed on the upper electrode corresponding to maxima of optical field intensity for at least one optical mode on a lateral plane in the optical cavity.

2. The device of claim 1 wherein the triangle mesa structure is truncated.

3. The device of claim 1 wherein the device is one selected from the group consisting of a light emitting diode (LED), a semiconductor laser diode, a resonance cavity LED, a unipolar semiconductor laser diode, a light output device, a semiconductor laser gyroscope and a semiconductor device generating light.

4. The device of claim 1 wherein the triangle optical cavity is truncated.

5. The device of claim 1 further comprising:

an additional plurality of triangle mesa structures formed on the substrate wherein each of the additional triangle mesa structures includes a structure generally the same as the triangle mesa structure;

an additional plurality of upper electrodes respectively formed on and respectively corresponding to the additional triangle mesa structures; and

a plurality of trenches providing optical connection among the triangle mesa structure and the additional triangle mesa structures.

6. The device of claim 5 wherein the triangle mesa structure and the additional triangle mesa structures are formed on the substrate in a topology selected from the group consisting of an array, cascade, lattice, super lattice, matrix, hollow matrix, hexagon and polygon.

7. The device of claim 5 wherein the triangle mesa structure and the additional triangle mesa structures are truncated.

8. The device of claim 5 further comprising a light output structure formed on the substrate for controlling light output direction.

9. The device of claim 8 wherein the light output structure is one selected from the group consisting of a triangle, ridge, plane waveguides and an optical fiber.

10. The device of claim 1 wherein the substrate is one selected from the group consisting of n-GaAs, n-InP, n-SiC and sapphire.

11. The device of claim 1 wherein the triangle optical cavity further comprises:

an upper waveguide mirror;

a lower waveguide mirror; and;

a waveguide layer disposed between the upper mirror and the lower mirror for vertical confinement of the light.

12. The device of claim 1 wherein the triangle mesa structure further includes an AlGaAs waveguide layer comprising:

an upper mirror selected from the group consisting of a p-type AlGaAs cladding layer and p-type AlGaAs superlattice;

a lower mirror selected from the group consisting of an n-type AlGaAs cladding layer and n-type AlGaAs superlattice; and

an upper contact layer made of p-type AlGaAs.

13. The device of claim 12 wherein the contact spots are shaped by a process selected from the group consisting of non-uniform metal deposition, metal deposition over a dielectric mask, non-uniform doping of the upper contact layer, and ion-implantation treatment of the upper contact layer.

14. The device of claim 1 wherein the contact spots are shaped by a process selected from the group consisting of non-uniform metal deposition, metal deposition over a dielectric mask, non-uniform doping, and ion-implantation.

15. The device of claim 1 further comprising a buffer layer made of BAlGaInN.

16. The device of claim 1 wherein the triangle mesa structure further includes an InGaAsP waveguide layer comprising:

an upper mirror selected from the group consisting of a p-type InP cladding layer p-type InGaAsP superlattice;

a lower mirror selected from the group consisting of an n-type InP cladding layer, n-type InGaAsP superlattice and n-type AlInGaAs superlattice; and

an upper contact layer made of p-type InP.

17. The device of claim 1 wherein the triangle mesa structure further includes an InGaN waveguide layer comprising:

an upper mirror selected from the group consisting of a p-type AlGaN cladding layer and p-type AlGaN superlattice;

a lower mirror selected from the group consisting of an n-type AlGaN cladding layer and n-type AlGaN superlattice; and

an upper contact layer made of p-type AlGaN.

18. The device of claim 1 wherein the triangle mesa structure further includes an InGaAs waveguide layer comprising:

an upper mirror selected from the group consisting of a p-type AlGaAs cladding layer p-type AlGaAs superlattice;

a lower mirror selected from the group consisting of an n-type AlGaAs cladding layer and n-type AlGaAs superlattice; and

an upper contact layer made of p-type AlGaAs.

19. The device of claim 1 wherein the triangle mesa structure further comprises an active layer selected from the group consisting of InGaAs/GaAlAs double heterostructure, InGaAs/GaAlAs single quantum well, InGaAs/GaAlAs multiple quantum wells, and current asymmetric resonance tunneling structure.

20. The device of claim 1 wherein the triangle mesa structure further comprises an active layer selected from the group consisting of

InGaAsP/GaAlAsP double heterostructure, InGaAsP/GaAlAsP single quantum well, InGaAsP/GaAlAsP multiple quantum wells, and current asymmetric resonance tunneling structure.